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This geometry will never replace the older geometries, but with further development many new theorems may be discovered. Any one interested in modern geometry will read the work with pleasure; and detecting the few slight errors will add a little zest.

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PROBLEMS AND SOLUTIONS.

EDITED BY B. F. FINKEL AND R. P. BAKER.

PROBLEMS FOR SOLUTION.

ALGEBRA.

443 Proposed by A. M. KENYON, Purdue University.

If p_r denote the sum of all the different r -factor products that can be formed from the first n natural numbers ($p_r = 0$ for $r > n$), and if

$$D_s = \begin{vmatrix} p_1 & 1 & 0 & \cdots & 0 \\ 2p_2 & p_1 & 1 & \cdots & 0 \\ 3p_3 & p_2 & p_1 & \cdots & 0 \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ sp_s & p_{s-1} & p_{s-2} & \cdots & p_1 \end{vmatrix}$$

show that

$$\sum_{i=0}^k (-1)^i c_i \binom{k}{i} D_{2k-i} = 0, \quad k, n = 1, 2, 3, \dots,$$

where $c_i = \frac{2k+1-i}{1+i}$ when i is even and $2n+1$ when i is odd; and $\binom{k}{i}$ is the coefficient of x^i in $(1+x)^k$.

444. Proposed by J. E. ROWE, Pennsylvania State College.

Prove that the determinant

$$\begin{vmatrix} \cot A & \cot B & \cot C \\ 1 & 1 & 1 \\ \cos^2 A & \cos^2 B & \cos^2 C \end{vmatrix} = 0,$$

where A , B , and C are the angles of a plane triangle.

GEOMETRY.

474. Proposed by LAENAS G. WELD, Pullman, Illinois.

Upon a fixed and constant base stands a system of co-planar triangles, for each of which the radius of the inscribed circle is to that of the circumscribed circle as $1 : 2$. What is the locus of the vertices opposite to the given fixed base?

475. Proposed by ELMER SCHUYLER, Brooklyn, N. Y.

Given two circles and a straight line, to draw a circle tangent to the line and coaxial with the two given circles.